DOCUMENT RESUME

ED 311 782 HE 022 823

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TITLE The Effects of Gender Disproportionate Representation on Women's Persistence in Undergraduate Majors.
PUB DATE 89
NOTE 70p.; M.A. Thesis, Ohio State University.
PUB TYPE Reports - Research/Technical (143) -- Dissertations/Theses - Master Theses (042)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Academic Persistence; Asian Americans; Black Students; College Students; Ethnic Groups; Group Dynamics; Higher Education; Hispanic Americans; *Majors (Students); Minority Groups; Pacific Americans; *Sex Bias; Sex Discrimination; *Sex Role; *Social Influences; Undergraduate Study; *Womens Education

ABSTRACT

A study was conducted to examine the factors influencing undergraduate women's likelihood of persistence in their majors, based on Kanter's theory that members of the numerical minority in any group experience role entrapment and performance pressure as a result of their underrepresentation. Interview data were obtained from a stratified, random sample of 636 female undergraduates that included a sampling of Black, Hispanic, Asian and Pacific Islander students. Findings included the following: (1) performance pressure had a statistically significant, negative impact on women's likelihood of persistence in their major; (2) role entrapment had the expected negative relationship to likelihood of persistence, but its effect was non-significant; (3) a curvilinear relationship was found between enrollment balance and likelihood of persistence in the undergraduate major; and (4) women in male-dominated majors, as well as those in female-dominated majors, were more likely to persist than women in majors where the enrollment was more balanced. Contains 31 references. (Author/KM)

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ED311782

THE EFFECTS OF GENDER DISPROPORTIONATE REPRESENTATION ON WOMEN'S PERSISTENCE IN UNDERGRADUATE MAJORS

A Thesis

Presented in Partial Fulfillment of the Requirements for the degree Master of the Arts in the Graduate School of the Ohio State University

by

Stacy Jo Rogers, B.A.

* * * *

The Ohio State University

1989

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HE 022 823

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Dedicated to my Mother, John,
Scott, Julie, and to Charlie

ACKNOWLEDGEMENTS

I would like to thank my advisor, Dr. Elizabeth G. Menaghan for her extensive support and guidance through this research. Thanks also go to Dr. Toby L. Parcel and Dr. Michael Wallace for their interest in this project and their helpful suggestions and comments.

To Charlie, I offer sincere thanks for your steadfast support and commitment. To Mom, John, Scott, and Julie, I thank you for all your encouragement and understanding.

THESIS ABSTRACT

THE OHIO STATE UNIVERSITY
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NAME: Rogers, Stacy, Jo

QUARTER/YEAR: Spring 1989

DEPARTMENT: Sociology

DEGREE: M.A.

ADVISOR'S NAME: Menaghan, Elizabeth, G.

TITLE OF THESIS: The Effects of Gender Disproportionate Representation on Women's Persistence in Undergraduate Majors

This research examined the factors influencing undergraduate women's likelihood of persistence in their majors. This study is unique in its use of Kanter's theory to investigate women's academic experiences in the undergraduate setting. Kanter argued that the members of the numerical minority in any group experience role entrapment and performance pressure as a result of their underrepresentation. As hypothesized, performance pressure had a statistically significant, negative impact on women's likelihood of persistence in their major. Role entrapment had the expected negative relationship to likelihood of persistence, but its effect was non-significant. A curvilinear relationship was found between enrollment balance and likelihood of persistence in the undergraduate major. Women in male-dominated majors, as well as those in female-dominated majors were more likely to persist than women in majors where the enrollment was more balanced.

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FIELD OF STUDY

Major Field: Gender

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Introduction

The purpose of this research is to examine the factors that contribute to the withdrawal of female undergraduates from traditionally male-dominated courses of study. The work is unique not only in its analysis of women's withdrawal from several undergraduate majors but with regard to its emphasis on proportional representation of women in these fields of study as a central explanatory factor.

Research has supported the often direct relationship between choice of college major and subsequent occupational status and earning power (Jacobs 1986; Bielby and Baron 1984). In its report of January 1988, the National Science Foundation Committee on Equal Opportunities in Science and Engineering stated that although women constituted 44% of the labor force in 1986, they held only 15% of all engineering and science related positions. This is an increase from the 1976 employment figure of 9% for women in such fields, but it does not alter the male-dominated status of these areas of employment. Undergraduate women have lower rates of participation in and higher rates of withdrawal from these traditionally male-dominated programs than their male counterparts (Lovely 1987). They frequently transfer to other areas of study which provide limited access to similarly high status, potentially lucrative careers. The detrimental consequences of such transfers for women's occupational status and earning power are well documented (Roemer 1983; Beller 1984). Appreciation of these facts is especially important given the fact that many women now and in the

future will be increasingly required to support themselves and their families. The withdrawal of many women from these fields also severely limits the amount of human potential which is available to meet the challenges of our increasingly technological society.

Past Research

Although the research specifically addressing women's withdrawal from nontraditional majors is limited, there are bodies of analysis concerned with the determinants of college major choice as well as with female persistence in male-dominated occupations. The quality of academic preparation, especially in areas such as mathematics and the sciences, has been considered a central factor in predicting college major choices and persistence in male dominated occupations (Lovely 1987; Elkins and Luetkemeyer 1974; Peng and Jaffe 1979). This is a logical expectation given that the majority of male-dominated fields are math and science related. Inadequate preparation is often expected of women studying these areas as a result of the stereotypes and the reality that young women typically study these subjects with less frequency than their male peers (Lovely 1987). However, Gardner (1976) and Ott (1978) reported that female students commonly transferred from engineering to other fields for reasons other than poor grades, in contrast to their male peers for whom grades often motivated transfers.

A more social psychological approach to the question has focused on individual attitudes rather than performance to assess the likelihood that female undergraduates would choose to study in male-dominated fields and to explain their degree of persistence in such occupations. Several studies have indicated that women's expectations for life-long employment and the value they place on a career as a source of satisfaction impact college major choice (Ellis and Herrman 1983; Haber 1980; O'Donnell and Andersen 1978). Ellis and Herrman (1983) found that high career commitment was displayed by women in both male-dominated and female-dominated majors while Haber (1980), O'Donnell and Andersen (1978) and Peng and Jaffe (1979) suggested that women studying in male-dominated fields were more strongly committed to careers than women in other majors.

Researchers have argued that the degree of emotional support women receive for their non-traditional aspirations is a central factor in women's choice of a college major (Ott 1978; Cook and Alexander 1980). Houser and Garvey (1983) emphasized the primary importance of the father's support for such plans, while Haber (1980), and Trigg and Perlman (1976) stressed the influence of the mother's support on women's persistence in a nontraditional field of study.

In contrast to the research that focused on the importance of the mother's support and encouragement, O'Donnell and Andersen (1978) expected employed mothers' role-modeling to have a positive effect on choice of a non-traditional major. Haber (1980) and Trigg and Perlman (1976) found that role-modeling was of secondary importance in influencing the choice of nontraditional major. Supporting the

conclusions of previous research, they indicated that the attitude and supportive behavior of the mother was more influential than her actual employment status.

Trigg and Perlman (1976) and Bielby (1978) found that undergraduate women's choice of male-dominated majors was influenced by their father's occupational status and income. Peng and Jaffe (1979) reported that father's high economic status increased the likelihood that women would follow an academic or college preparatory program in high school, thus being better prepared for college level studies. In addition, there is the possibility that families with high income can purchase better education for their children, such as many expect from private schools.

Previous research has focused on individual and social psychological characteristics as well as demographic factors to explain female undergraduates' choices of major and their persistence, or lack of it (Houser and Garvey 1983; Trigg and Perlman 1976; Haber 1980). It will be argued here that structural factors provide a more complete explanation of the process. The disproportional representation of women and men in traditionally male-dominated areas of study and the subsequent effects on behavior and attitudes are ignored by the body of previous research. Although many of the attitudinal variables have some explanatory value, they must be considered within the context of disproportionate representation of women in these fields.

Theoretical Basis for Present Research

Rosabeth Kanter (1977a) discussed the importance of proportional representation for achievement in group work situations, stating that groups can be thought of in terms of their proportional representation of types of persons. Uniform groups are homogeneous with respect to the types of members, while the most severely imbalanced representation is found in skewed groups. In skewed groups one type of person forms a distinct, numerical majority with a ratio of at least 85:15 of majority group members to minority group members. In such cases, the majority group controls the general character of the group, while minority group members may be viewed as symbols of their category, known as tokens. Tilted groups are described by Kanter (1977a) as having less exaggerated distinctions between majority and minority group members than are found in skewed groups. The ratio of representation in tilted groups may be at least 65:35 and it becomes more possible for the members of the numerical minority to be viewed as individuals, though the group remains unbalanced. Finally, a balanced group moves to a ratio of 50:50. It is one in which members are differentiated more on the basis of ability than on master statuses such as race, sex and ethnicity.

Kanter (1977a; 1977b) stated that proportional representation in groups has a direct effect on the types of interaction which occur between group members. Members of the numerical minority in a group are held to stricter standards of performance than are the majority group members. Because of their differentness, minority group members are treated not as individuals, but according to the stereotypes

surrounding their group. It is important to note that the types of interaction in these groups are expected to occur regardless of the master statuses or other characteristics of the majority and minority groups (Kanter 1977a). That is, the situation for the few men in a group with many women is expected to be similar to that for a few blacks among many whites.

Kanter (1977a; 1977b) proposed that as a result of their underrepresentation, minority group members experienced performance pressure and role entrapment which combine to affect their interaction and success. Performance pressure is the result of the high visibility of minority group members. They stand in relief against the rest of the group and as a result, the attributes of their master status obscure their success and render their mistakes readily visible. Kanter (1977a) indicated that a common strategy in these situations is for the minority group member to adopt a non-threatening, low profile. This allows the individual to work, while avoiding all conflict and high visibility situations. Kanter (1977a) identified this as the true situation behind what appears to be the 'fear of success' phenomenon in women. Thus, the effects of gender representation on women's behavior are often falsely attributed to socialization and individual sex role attitudes.

Role entrapment was discussed by Kanter (1977a) as a situation in which the minority group members are led into playing or are expected to enact roles within the organization that conform to the stereotypes surrounding their group. Kanter (1977b) stated that role entrapment is useful for members of the dominant group in that it allows them to easily categorize minority group members, thus reducing ambiguity in interaction. This affects not only the personal interactions of minority group members in the workplace, but their chances for occupational success. Kanter (1977b) noted that women in the corporation she studied were treated as emotive or supportive persons by male colleagues, whether or not the women displayed these characteristics. They became identified with traits that are considered detrimental to success in business.

Kanter (1977a) also identified social isolation as another general hypothesized effect of underrepresentation, though this experience is expected to be less salient for most students in undergraduate study than it may be in other settings. The professional programs and occupations that have been studied using Kanter's (1977a) theory frequently demand participants' undivided commitment to their specific area (Spangler, Gordon and Pipkin 1978). Undergraduate students are expected and indeed encouraged to participate in a variety of academic and non-academic activities and to cultivate a variety of academic interests from which to later choose an area of study. Opportunities to participate in a variety of activities outside the major result in a wider range of social contacts, and less likelihood of isolation among undergraduate women than has been found among women in the professions

(Mandelbaum 1978; Epstein 1981). This analysis will consider only the effects of performance pressure and role entrapment on women's persistence in male-dominated and non-male-dominated majors.

Empirical Support for Kanter's Model

Kanter's (1977a; 1977b) model of the effects of disproportionate representation on women's status and achievement in work groups has helped to illuminate the situation of women in a variety of educational and employment settings, including medicine (Mandelbaum 1978; Bourne and Wikler 1978), law (Epstein 1981), and science teaching (Humrich 1988). Women studying and practicing in the fields of medicine and law experienced consequences of the male-dominated professional structure in ways very similar to what Kanter (1977a; 1977b) described as performance pressure and role entrapment. Spangler, Gordon and Pipkin (1978) tested Kanter's hypotheses directly in a study of women law students. They found that experiences of performance pressure and role entrapment affected women's performance and likelihood of persistence in law school.

Epstein (1981) found that women studying law were in a defensive position in the classroom and experienced a high degree of performance pressure as a result of their low numerical representation. They often responded to this by finding themselves frozen and unable to respond when called upon. Women in medical school were pressured to display certain personal characteristics as well as a mastery of the material (Bourne and Wikler 1978). Traditionally valued male characteristics such as assertiveness, independence and career commitment were considered paramount by faculty and weighed very heavily in evaluations

of students' potential for future professional success.

Women studying medicine were pressured to complete their training in the same fashion as male students, despite family responsibilities which made this difficult. Their requests to study part-time or to arrange their pattern of medical rotations in any way that would facilitate the combination of medical studies and family responsibilities were denied or dismissed (Bourne and Wikler 1978).

Women in medicine and law experienced a type of role entrapment in that they were expected to be and treated as though they would be unable to combine the traditionally male careers they were pursuing with the traditionally feminine roles of wife and mother it was assumed they would also hold. Bourne and Wikler (1978) found that women in medical school who valued marriage and family life as future goals or current lifestyles recognized the opposition between the demands of home life and a medical career.

Spangler, Gordon and Pipkin (1978) specifically tested Kanter's (1977a) hypotheses regarding the effects of disproportionate representation. Their study compared the performance and satisfaction of female law students at two reputable universities. At one university women constituted a distinct numerical minority; at the other institution, the number of females and males was more balanced. At the institution where women were significantly underrepresented they frequently reported a higher level of performance pressure and serious contemplation of withdrawal from law school. Women at the institution where representation was more equitable reported performance pressure and contemplation of withdrawing from school less frequently.

At the law school where women were in the numerical minority, they were more likely to choose the low prestige, typically feminine areas of family practice and public law. At the institution where they were represented in greater numbers, fewer women made such stereotypical career choices. Spangler, Gordon and Pipkin (1978) interpreted this as indicating a high level of role entrapment among women in the institution where they constituted a numerical minority.

The proportional representation of women has also been shown to affect various outcomes for women in the field of science education. Humrich (1988) stated that there are more women teaching biology than either physics or chemistry. Women in the field of biology education reported reading professional journals and attending professional meetings more frequently than women in chemistry or physics education. Humrich (1988) suggested that because women are represented in greater numbers in biology education, they are accepted by professional peers and under less pressure to perform flawlessly. Humrich (1988) concluded that as a result, women in biology education are able to communicate the material in a fashion which is effective for the students. In support of this argument, Humrich (1988) found that female biology teachers had a positive effect on the performance of both male and female secondary school students, while female chemistry and physics teachers had a negative effect on students' achievement.

In addition to its effects in these specific areas of professional education and employment, labor market analysts have found that the proportion of women in an occupation has important implications. In their discussion of comparable worth, England and Norris (1985) indicated that the proportion of women in an occupation has a direct, negative impact on the earnings of workers of both sexes in that occupation. This occurs apart from the skill requirements of the work. Even while controlling for the skill demands of jobs, researchers have found that high concentration of women in an occupation has a negative effect on the wages for year-round, male and female, full time workers (England and Norris 1985; Parcel and Mueller 1989; Parcel 1989). Women are also overrepresented in fields that provide low status and few promotional opportunities compared with men (Parcel 1989). When women are represented in occupations with men, they are often denied access to the promotional tracks that offer higher wages and benefits (Bielby and Baron 1984).

The Present Research

Given the documented importance of women's numerical representation for outcomes in professional education and in a variety of occupations, it is appropriate to extend the analysis to undergraduate education. Jacobs (1986) argued that college majors provide a context for academic achievement and a high degree of social interaction. Thus, the process that Kanter (1977a) described as affecting the interaction and success of minority group members in occupational work groups can be used to examine the situation of women in both male-dominated and non-male-dominated undergraduate majors.

Kanter (1977a) proposed that certain behavioral accommodation techniques would be evident among the members of the numerical minority in a group. Withdrawal from the situation, here the undergraduate major program, is also a likely response to the powerful negative effects of membership in a numerical minority (Jacobs 1986). This study will outline testable hypotheses measuring the impact of disproportionate representation on undergraduate women's persistence in male-dominated and non-male-dominated fields of study.

The present research will focus exclusively on a group of undergraduate women. One of the strengths of the work is the ability to test hypotheses using a sample of undergraduate women from a variety of major programs with a range of female representation in enrollment. The ability to make these comparisons will allow for thorough investigation of the influence of disproportional representation of women on persistence in male-dominated fields of study.

In this research, it is important to make a distinction between what is called performance pressure and the pressure brought about as a result of insufficient academic preparation in high school. While performance pressure occurs independently of the minority group member's preparation for performance, mastery of relevant material is central to the individual's ability to accomplish a given task, and is quite independent of the pressure caused by high visibility (Kanter 1977b). The effects of both high visibility and inadequate training may impact women's persistence in non-traditional fields of study. The effects of performance pressure will be examined while controlling for actual academic preparation, in addition to other relevant factors.

In this study, role entrapment will be defined as the perception on the part of female undergraduates that careers in their major field cannot be successfully combined with marriage and family life (Epstein 1981; Mandelbaum 1978). A great deal of previous research has focused on the conflict between women's family oriented plans and nontraditional career aspirations (Haber 1980; Trigg and Perlman 1976; Peng and Jaffe 1979). The experience of role entrapment is believed to occur when women desire marriage and family life in addition to a career, and believe that a career in their major will be difficult to combine with family life. This definition of role entrapment facilitates investigation of the effects of this conflict on women's persistence in their major.

Specific Hypotheses of the Present Research

The enrollment balance of women and men in a field of study is expected to have a significant effect on women's persistence, in addition to the performance pressure and role entrapment it may bring about. Women in male-dominated majors are expected to be less likely to persist in their fields of study than women in majors where the enrollment is balanced or female-dominated. Women in male-dominated majors are also expected to be more likely to experience performance pressure and role entrapment, which Kanter (1977a) indicates are results of disproportionate representation.

Both performance pressure and role entrapment are expected to be negatively related to women's persistence. It is expected that performance pressure will be higher among women in male-dominated majors. This is primarily the result of their high visibility within

the group. For women in both male-dominated and non-male-dominated fields of study, performance pressure is hypothesized to be negatively associated with persistence in the declared major.

Role entrapment is expected to be higher among women in male-dominated majors who value marriage and family life as future goals than among women in other areas of study who value such goals. Role entrapment is hypothesized to negatively influence women's persistence in their fields of study, regardless of the enrollment balance. However, role entrapment is expected to occur more frequently among women in male-dominated fields of study.

The central hypotheses involving performance pressure and role entrapment will be tested while controlling for the effects of several other factors believed to be of importance in explaining female withdrawal from male-dominated fields of study.

The household income of women's parents is expected to have a positive effect on their persistence in both male-dominated and non-male-dominated fields of study. The effect is expected to be stronger for women in male-dominated fields of study.

Father's occupational status is expected to have a positive effect on women's persistence in both male-dominated and non-male-dominated fields of study, though the effect is expected to be stronger for women in male-dominated fields of study.

Mother's occupational status is expected to have a positive effect on women's persistence in their fields of study. This effect is expected to be stronger for women studying in male-dominated majors.

Mother's and father's level of education are expected to have positive effects on women's persistence in any field of study. However, the effect is expected to be stronger for women in male-dominated fields of study.

Emotional support given by either parent is expected to be positively related to women's persistence in both male-dominated and non-male-dominated majors. The effect of parental support is expected to be equally strong for women in male-dominated and in non-male-dominated fields of study.

The level of high school math and science preparation is believed to be directly, positively related to women's persistence in their chosen course of study. The effect is expected to be stronger for women in male-dominated fields of study, which are largely math and science fields.

The level of high school verbal and social science preparation is expected to be directly, positively related to women's persistence in their field of study. Verbal acuity is important in all college majors, though it is likely to be less central in math and science areas. The effect is expected to be stronger for women in non-male-dominated fields of study.

Past research provides no evidence as to whether or how the hypothesized relationships between representation of women and their withdrawal from their majors will differ by race, after controlling for the levels of background variables. However, race may have an additive affect on women's persistence in both male-dominated and non-male-dominated fields of study. For non-white women it is expected

that their statuses as women, and members of racial minority groups will greatly affect their experiences in the male-dominated majors, making them more likely to withdraw from male-dominated majors than their white peers. The effect is expected to be stronger for women in male-dominated majors.

METHODS

Unit of Analysis and Study Population

The present study utilizes interview data from individual undergraduate women who began full-time undergraduate study in Autumn 1986 and were enrolled at the Ohio State University in Spring 1988 when telephone interviews were conducted. This data comes from a larger data set which contains a wealth of information pertaining to numerous characteristics of enrolled and not enrolled students that are hypothesized to influence student retention. This information includes data on high school academic experiences and employment history, undergraduate behavior and level of satisfaction, as well as social and occupational goals, self-assessment and demographic characteristics.

Sampling Design

Sample selection was done through a multistage, disproportionately stratified, random sample of the 6,863 students who had begun full-time undergraduate study, holding twelve credits or more, at the Ohio State University Columbus Campus in the Autumn quarter of 1986. Students who withdrew during their first quarter, or dropped below twelve credit hours were not included in the population. The eligible population of 5,596 domestic students was first divided into two groups based on enrollment status for Spring quarter of 1988. A disproportionate, random sample stratified by race was then taken from each group, with over-sampling of non-white students. The target population consisted of four groups: (1) Whites; (2) Blacks; (3) Hispanics; (4) Asian and Pacific Islanders. Students whose ethnicity was unknown, and the three

American Indian students were not included. Because of the sampling procedure, weights were used to adjust the sample to reflect the ethnic proportions in the eligible population of 5,596. All further information reported in this research reflects weighted data.

Table 1 presents the composition of the study population, the sample and respondents, among enrolled students. The composition of the sample of women used in this research is also presented in Table 1. Although the majority of interviews were obtained by telephone, mail questionnaires were sent to the 35 individuals in the sample for whom no telephone number was available. Ten of these questionnaires were completed and returned. A total of 636 interviews were completed from the sample of 813 students enrolled for study in Spring 1988. The response rate for this research is 78.23%. Approximately one half or 309 of those in the sample of currently enrolled students were women.

In addition to the interview data, data on variables such as high school and college grade point averages, standardized test scores, mathematics and English placement scores were taken from the Ohio State University student database, and matched to the appropriate cases of interview data.

The response rates for the racial sub-groups were similar. Respondents and non-respondents were tested for differences on several demographic and academic characteristics. Chi-square tests indicated that the respondents and non-respondents did not differ significantly with regard to race or sex. Tests for mean difference were calculated for several of the academic performance measures. Respondents and non-respondents were compared on the mathematics and English placement

Table 1. Study Population, Survey Sample, Total Interviewed, and Women Interviewed (Research Sample) Characteristics.

Currently Enrolled as of Spring 1988	Population		Survey Sample		Total Interviewed		Women Interviewed (Research Sample)	
	N	%	N	%	N	%	N	%
White	3973	92.9	511	62.8	407	64.0	180	63.2
Black	155	3.6	155	19.1	114	18.0	58	20.3
Hispanic	36	.8	36	4.4	27	4.2	8	2.8
Asian-Pacific Islander	111	2.6	111	13.7	88	13.8	39	13.7
American Indian	2	0	0	0	0	0	0	0
Total Enrolled	4277	100%	813	100%	636	100%	285	100%

scores assigned to each by the university, their composite ACT scores, and their mathematics and verbal scores on the SAT examination. The two groups did differ significantly on the mathematics placement score, the mathematics score of the SAT examination, and the ACT composite score, with the interviewed group scoring higher than the non-interviewed group. However, the respondents and non-respondents did not differ significantly with regard to English placement scores and the verbal score of the SAT examination. Measures of current academic performance were not significantly different between the two groups. The cumulative college grade point average, as of Spring quarter 1988, and the cumulative credits completed as of the same date, did not differ significantly. Thus, except for small differences in some standardized scores, the two groups are quite similar.

Nevertheless, this sample is somewhat biased in that students who began Autumn quarter as full-time students but dropped to fewer than twelve credit hours or withdrew from the university during that first quarter, were excluded from the sampling frame. This affects the study sample by excluding those students who were apparently most at risk for attrition, thus making less information about the problem of women's persistence available for analysis.

This study will concentrate exclusively on the experiences of undergraduate women who had declared a major field of study at the time of the interview. The Ohio State University has a very diverse undergraduate population of approximately 43,607 students (1986 Registrar Report). Given the size and diversity of the undergraduate population, it is likely that this sample is quite similar to the

general population of female undergraduates in the Midwestern United States. This allows greater confidence in the potential generalizability of the results.

Because the data were collected in the Spring of their second year, it is possible that a number of women who have been influenced by the effects of underrepresentation have been missed in the analysis. The women most strongly influenced by the situation in male-dominated majors may have already changed to other majors by the Spring of their second year of college. However, this does not negate the importance of the current study. The use of sophomore level, cross-sectional data provides a more realistic test of the hypotheses. As sophomores, students take more classes in their major field, assume the identity of a serious student in the area, and receive reactions from others that are based on the reality of their study in that area. The women remaining in the male-dominated fields are likely to be adequately prepared, diligent students. If negative effects of disproportionate representation are found, it is likely that such effects were present among those women who already withdrew from the male-dominated majors. The presence of such effects will encourage further, more detailed analysis through the use of longitudinal data at a later point.

Measurement

1. Dependent Variable

The dependent measure to be used in this study is an interval level variable derived from a question which asked the respondents to assess the likelihood that they will keep the same major until they graduate. They were to respond based on a 10 point scale where a score of 1 indicated low likelihood of persistence and a score of 10 indicated high likelihood of persistence in the major. The item and its means and standard deviation are presented in Table 3. The mean for this item was 8.28 with a standard deviation of 2.13. This indicates that on average, the women in this study were very confident that they would complete their degrees in their present major. Because the dependent and independent variables are interval level or can be assumed to function as such, multiple regression will be used in conducting the analysis.

2. Key Independent Variables

To determine the proportional representation of women in each undergraduate major, enrollment in each major as of the fourteenth day of Autumn 1986 was obtained. This information was gathered from a combination of departmental and college level sources. The proportion of men in each department represented among this sample of women is presented in Table 2. Given the departmental and college level enrollment figures, it follows that representation in individual classrooms is often unbalanced, though to varying degrees. The enrollment figures reflect the situation that these women faced as new undergraduates when they began to make decisions about which fields of

Table 2. Enrollment of Women in the Sample, by Major and Proportion Male (N=282).

Skewed (85%-100% Male)			Tilted (65%-84% Male)			Balanced (35%-64% Male)			Female Dom. (0-34% Male)		
Major Title	N	Prop. Male	Major Title	N	Prop. Male	Major Title	N	Prop. Male	Major Title	N	Prop. Male
Aerospace Eng.	2	.89	Agricult. Econ.	3	.83	Accounting	10	.50	Allied Medical	33	.19
Aviation Eng.	3	.96	Ceramics Eng.	1	.77	Animal Science	3	.61	Art History	1	.10
Civil Eng.	3	.85	Chemical Eng.	1	.65	Anthropology	2	.42	Dental Hygiene	4	.02
Electrical Eng.	2	.87	Computer Eng.	4	.76	Art	2	.45	Education	45	.33
Mechanical Eng.	4	.87	Economics	1	.82	Biochemistry	1	.64	Home Econ.	8	.14
			Finance	3	.71	Biology	9	.53	Nursing	19	0.00
			History	2	.74	Botany	1	.50	Physical Educ.	2	.33
			Insurance	1	.65	Communication	8	.46	Social Work	8	.08
			Landscape Arch.	3	.70	Criminology	3	.64	Speech/Hearing	2	.33
			Mathematics	2	.66	English	5	.38	Textiles	6	.14
			Nat. Resources	1	.82	Food Science	4	.41			
			Philosophy	1	.78	Human Resources	8	.50			
			Photography	3	.83	Industrial Des.	4	.55			
			Political Sci.	4	.67	Intnl. Business	6	.47			
			Product. Mgmt.	1	.75	Journalism	11	.61			
			Transportation	1	.75	Marketing	8	.57			
						Medieval Studies	1	.50			
						Microbiology	3	.51			
						Music	3	.54			
						Psychology	9	.37			
						Theatre	4	.55			
						Zoology	3	.48			
Total Enrollment	14			32			108			128	282

study to pursue.

Obtaining figures on departmental enrollment was difficult only in the case of the College of Education. This college contains a wide variety of educational specialties. Because enrollment information was unavailable for these areas, the enrollment figures for the college as a whole were used. These suggest that only 33 percent of the students are male. It is possible that some majors within education are incorrectly classified as a result.

The measurement of enrollment in each department by gender is coded in several forms, as a continuous, linear measure, a categorical measure and a curvilinear measure. The initial focus is on the continuous, linear measure. This decision is based on the understanding that Kanter's (1977a) discussion of group representation in terms of being homogeneous, skewed, tilted, and balanced is more appropriately used as an heuristic device than as a suggestion for measurement. The continuous measure is expected to capture any subtle variations in representation that would be masked by categorical measures of enrollment as skewed, tilted and balanced. Results of analyses using the continuous, linear measure indicated the need for the other forms.

A categorical measure of enrollment was used in the analysis in an effort to more fully understand the complex effects of enrollment balance on likelihood of persistence in the major, performance pressure and role entrapment for various enrollment groups. Nine categories were created, each representing a 10 percent range in group representation, with the exception that the single case in the 20% male

to 29% male enrollment group was combined with the cases in the 30% male to 39% male enrollment group. This measure was effective in describing complex relationships that could not be accurately summarized with simple linear or curvilinear terms. This measure is presented in the results for performance pressure, role entrapment and the career and family measures.

Analyses predicting likelihood of persistence in the major using continuous and categorical measures of enrollment balance indicated that the relationship could be more clearly summarized with a curvilinear measure of enrollment. In constructing this measure, values for the proportion of men in a major, which range from .02 to .96 were recoded to range from -.48 to +.46. These values were then squared to create the appropriate curvilinear measure; a parabolic curve with values ranging from high to low to high.

Perceived performance pressure is one of the two key independent variables used in this research. Eleven items were expected to tap aspects of perceived performance pressure in students. These items asked students to assess their satisfaction with their high school training and with their college instructors. They are also asked to indicate the frequency with which they ask questions in class, see their professors in their office and other similar types of behavior relating to how actively they are involved in their classes.

These eleven items were subjected to exploratory factor analysis using principal axis factoring and oblique rotation. Initial communality estimates were examined, and the items with very low communalities and low variability were omitted from subsequent analyses. The factor analysis solution initially extracted two factors which met the eigenvalue criteria. Of these, one was clearly substantively interpretable, while a second contained an unclear combination of a small number of the items.

A second analysis was performed using the same method of factor analysis, but constraining the number of factors to one. An item was interpreted as loading on a factor if it loaded with an absolute value of .30 or greater. The resulting factor was named Perceived Performance Pressure. Loading on it were nine items which tapped the students' satisfaction with teacher contact; satisfaction with teacher approachability; the frequency with which they volunteer an answer to a question in class; ask a question or raise a point in class; speak with professors after class; see professors in their office; speak with professors informally; question a professor about a grade they have received; and what they do when they are confused in class. The items were standardized and used to construct a factor-based scale of Perceived Performance Pressure. The resulting scale had a reliability of .77, indicating that the scale is internally consistent.

The women in this study report moderate to low amounts of active class participation or consultation with their professors. In spite of this level of participation, most report being satisfied with the amount of contact they have with their teachers. On average, they also

appear satisfied with the quality of their high school training. The women in this sample perceive a low degree of performance pressure. Scale and item statistics are presented in Table 3.

The second key independent variable to be employed in this research is role entrapment. In order to construct a measure of role entrapment, it is necessary to measure the desirability of family life in combination with a career, and the difficulty expected in combining family life and a career. Five items on the 1988 Student Survey serve as measures of the student's attitudes toward the importance and likelihood of marriage and family life in their future plans.

The five items were subjected to exploratory factor analysis, using an oblique rotation and principal axis factoring, in an effort to construct a scale of Desirability of Marriage and Family life. An item was accepted as loading on a factor if the loading was .30 or higher. The exploratory factor analysis produced a factor solution with two unclear factors meeting the eigenvalue criterion. A second analysis was performed constraining the number of factors to one. The resulting factor contained four items and was substantively interpretable. It was named Desirability of Family Life. Loading on it were four items which tapped the importance of marriage and of children as future goals; the importance of having a career that could be easily combined

Table 3 Factor Based Perceived Performance Pressure Scale: Scale and Item Statistics

ITEM CONTENT	FACTOR LOADINGS	MEAN	STANDARD DEVIATION
Now I'd like to ask you a few questions regarding contact with your professors. Do you (1)often (2)sometimes (3)rarely (4)never			
Ask a question or raise a point in class	.63	2.38	.77
Speak with professors informally (such as while walking on campus)	.66	3.04	.83
Volunteer an answer to a question in class	.57	2.32	.87
Speak with professor immediately after class	.60	2.55	.80
See professors in their office	.50	2.59	.72
Question professor about a grade	.42	2.68	.74
What do you do when confused in class? (1)ask professor in class (2)ask professor outside class (3)ask another person in the class (4)figure it out yourself or do nothing	.48	2.70	1.04
On a 7 point scale from, (1)very satisfied (7)not satisfied how satisfied are you with:			
Amount of contact with teachers outside class	.54	3.53	1.71
Teachers' approachability outside class	.38	2.92	1.43
How adequate do you feel your high school training was in preparing you for college level work at Ohio State (1)very adequate (2)somewhat adequate (3)somewhat inadequate (4)very inadequate	.05	1.72	.79
How often do you socialize with professors in a non-academic setting (1)often (2)sometimes (3)rarely (4)never	.22	3.78	.51
Eigenvalue	2.66		
% Variance	24.3		
Number of Items	9		
Chronbach's alpha	.77		

All factor loadings are shown. Loadings above .30 were used in scale construction. Factor analysis was done using weighted data. Actual number of cases used was 279 due to listwise deletion of cases with any missing values.

with marriage and family life; and the likelihood of marriage in the next three years. On average, the women in this sample consider marriage and family life highly desirable, though they expect to postpone them for at least three years. The items were standardized and used to construct a factor based scale. The Desirability of Family Life scale has a reliability coefficient of .81, indicating that it is internally consistent. A constant was used to recode all scale values to positive, non-zero values. The mean on the scale was 7.80 with a standard deviation of 3.09. Scale and item statistics are presented in Table 4.

The perceived difficulty of combining family life with career was measured by a categorical measure presented in Table 4. This item was coded using positive, non-zero values. The mean value for this measure was 1.51 with a standard deviation of .58, indicating that on average, these women are optimistic about their ability to combine career and family.

The desirability of marriage scale and the measure tapping the perceived difficulty combining family life and a career were used to construct the measure of role entrapment. The values for each measure were multiplied to create the continuous measure of role entrapment with low values indicating little or no role entrapment for those who either do not value marriage and family life, or are optimistic about the combination. Women who highly value marriage and family life, yet

Table 4 Measurement of Role Entrapment: Scale and Item Statistics for Factor Based Desirability of Marriage and Family Life Scale: Item Statistics for Career-Family Conflict and Role Entrapment

ITEM CONTENT	FACTOR LOADINGS	MEAN	STANDARD DEVIATION
Desirability of Marriage and Family Life			
Is it (3) VERY IMPORTANT (2) SOMEWHAT IMPORTANT or (1) NOT IMPORTANT that you			
Get Married	.93	2.41	.69
Raise a Family	.88	2.40	.71
Is it (3) VERY IMPORTANT (2) SOMEWHAT IMPORTANT or (1) NOT IMPORTANT that the type of career you will have can be easily combined with marriage and family life	.65	2.60	.57
Is it (4) VERY LIKELY (3) SOMEWHAT LIKELY (2) SOMEWHAT UNLIKELY or (1) VERY UNLIKELY that you will			
Get married within the next three years	.41	2.12	1.09
Have a child within the next three years	.10	1.19	.53
Eigenvalue	2.58		
% of Variance	51.8		
Number of Items	3		
Chronbach's alpha	.81		
Difficulty Combining Career-Family How likely is it that your career will be easily combined with marriage and family life? Is it (1) VERY LIKELY (2) SOMEWHAT LIKELY (3) NOT LIKELY AT ALL		1.51	.58
Role Entrapment		10.82	5.15

All factor loadings are shown. Loadings above .30 were used in scale construction. Factor analysis was done using weighted data. Actual number of cases used was 279 due to listwise deletion of cases with any missing values.

expect it will be difficult to combine family and career will have the highest scores, indicating role entrapment. This measure is presented in Table 4. The mean for this measure was 10.82 with a standard deviation of 5.15, indicating that on average, the women in this sample experience a very low level of role entrapment, if at all.

Though not addressed by Kanter (1977a), desirability of marriage and perceived difficulty of combining family and career may impact women's persistence independently of role entrapment. This is investigated by employing the measures separately in the analysis, in addition to the measure of role entrapment. As might be expected, perceived difficulty of combining family and career is correlated with the measure of role entrapment which it is used to construct (r=.798).

The measures of perceived performance pressure and role entrapment have face validity. Several items in each of the factor based scales are similar to items used in previous research. Many are similar to measures used in Spangler, Gordon and Pipkin's (1978) study of tokenism in law school, in which they directly tested Kanter's (1977a) theory. The items they used were successful in distinguishing between responses and behaviors of women in schools where they constituted a numerical minority and women in law schools where they were more equally

represented with men. In addition to utilizing the items from previous research, the present study constructs indicators which include other relevant items in the measurement of perceived performance pressure and role entrapment. With the addition of new items to those that have already proven reliable and valid, the present measures are expected to perform effectively.

3. Other Independent Variables

Household income was measured by an item which asked the respondents to report their families' household income in 1987, rather than the income of the father as is the traditional method. This will provide a more accurate picture of family resources by including the financial contributions of mothers who work outside the home. The unstandardized mean household income score was 8.56 with a standard deviation of 3.69. This corresponds to an annual income level of approximately 40,000 to 45,000 dollars. This measure was standardized for the analysis. The item, the unstandardized mean and standard deviation are presented in Table 5 along with those for the other independent variables.

It is well known that reports of income are often among the most unreliable. The current interval level measure has the added limitation of depending on student reports of parental income. Thus, errors in this measure are more likely to result from misinformation

Table 5 Basic Statistics, Dependent Variable and Control Variables

Item Content			Mean	Standard Deviation
LIKELIHOOD OF PERSISTENCE IN MAJOR				
On a scale from (1) to (10), where (10) is ABSOLUTELY CERTAIN, how certain are you that you will:				
Keep the same major field until you graduate?			8.28	2.13
HOUSEHOLD INCOME IN 1987 (Unstandardized)			8.56	3.69
1. less than 10,000	8. 40,001 to 45,000			
2. 10,001 to 15,000	9. 45,001 to 50,000			
3. 15,001 to 20,000	10. 50,001 to 55,000			
4. 20,001 to 25,000	11. 55,001 to 60,000			
5. 25,001 to 30,000	12. 60,001 to 65,000			
6. 30,001 to 35,000	13. 65,001 to 70,000			
7. 35,001 to 40,000	14. 70,001 to 75,000			
	15. over 75,000			
MOTHER'S AND FATHER'S YEARS OF EDUCATION				
Years before h.s.	Two yrs college,	Mother	13.80	2.05
(Eg. 8th grade=8)	two yr degree =14	Father	15.00	2.78
Two yrs high school=10	Four year degree=16			
Three yrs college =15	Masters degree =18			
High school degree =12	Law, Medical =19			
One yr college =13	PhD =21			
MOTHER'S AND FATHER'S OCCUPATIONAL STATUS				
DUNCAN TSEI2 SCALE LOW (13.81) TO HIGH (90.45)				
What is your mother's occupation? (Unstandardized)			35.74	19.90
What is your father's occupation? (Unstandardized)			52.05	20.75
MOTHER'S AND FATHER'S SUPPORT				
Now I would like to know whether other people approve of your current major.				
What about your mother, would you say she:			2.90	.42
What about your father, would you say he:			2.89	.40
(1)DISAPPROVES (2)DOESN'T CARE (3)APPROVES				
MATHEMATICS AND SCIENCE PREPARATION INDEX				
Standardized math placement score				
Standardized item-ACT mathematics and science scores, substituting SAT mathematics score if necessary			-.02	1.83
VERBAL AND SOCIAL SCIENCE PREPARATION INDEX				
Standardized English placement score				
Standardized item-ACT English and Social Science scores, substituting SAT verbal score if necessary			-.02	1.84
RACE				
(1) Non-white (0) White			.07	.26

Response categories are presented in the recoded form used in this research. Means and standard deviations were calculted with weighted data. N=282.

than from deliberate falsification. The extensive number of categories and the five thousand dollar intervals between them provide a satisfactory amount of variation.

Mother's education and father's education were measured using items which asked separately, the number of years of school completed by each parent. For these items, as well as all others involving parental information, the respondents were free to answer in terms of step-parents whenever appropriate. However, responses were coded identically whether the referent was a biological parent or a step-parent, making it impossible to determine which referent was used if both biological and step-parents were alive. As with any item that elicits information regarding someone other than the respondent, the measures of parental education are subject to errors in reporting. However, there is no reason to believe that such errors will be systematic. The measures of educational achievement for each parent will stand as individual variables in the multivariate analysis. The items, their means and standard deviations are presented in Table 5. On average, the women's mothers have 13.80 years of education, while their fathers have an average of 15.00 years of education.

As might be expected, household income and parental education are intercorrelated, though the relationships are weak. This indicates that including parental education and household income separately in the model will not produce problems of multicollinearity.

Father's occupational status is measured by an open ended question which asks the students to name their father's occupation. The open-ended responses to this item were recorded verbatim and matched to the socioeconomic index for detailed census occupational categories. This index is based on the 1970 U.S. Census information and coded at the detailed, three digit occupational level (Stevens and Featherman 1981). Coding in this way allowed the subsequent assignment of meaningful occupational status scores. The Duncan Total Socio-Economic Index 2 (TSEI2) scale was used in coding both mother's and father's occupation because it is independent of the race or sex of the worker. This was important given that the occupations of women as well as men were of interest (Stevens and Featherman 1981). The weighted mean occupational status score for father's occupation was 52.05 with a standard deviation of 20.75. On average, the women's fathers were of moderate socioeconomic status. The item and the mean and standard deviation of the resulting occupational status score are presented in Table 5.

Mother's occupational status is measured by an open ended question which asked the respondent to state their mother's occupation. The responses were recorded verbatim and matched to the socioeconomic index for detailed 1970 U.S. Census occupational categories (Stevens and Featherman 1981) in the same fashion as father's occupation. Occupational status scores were subsequently assigned to the occupational categories. The measure was standardized for the analysis, with women who reported their mothers as homemakers receiving the mean on this item. The unstandardized mean occupational status score for mother's occupation was 35.74 with a standard deviation of

19.90. As expected, the women's mothers were of moderately low occupational status, in comparison to the socioeconomic status of the fathers. The item, unstandardized mean and standard deviation of the occupational status score are presented in Table 5.

Some previous research argues that mother's employment is important apart from the status of her occupation (O'Donnell and Anderson 1978). To test this, a second measure of mother's occupation has been constructed. This is a categorical variable distinguishing between mothers who are employed outside the home, and mothers who are homemakers. Approximately 69 women, or 25% of the sample reported that their mothers were homemakers. 207 women, or 74% of the sample reported that their mothers were employed outside the home. Modal occupations were secretary (12%) and manager (12%).

The measurement of parental occupation used here has certain limitations. Simply asking the students to indicate the occupation of their mother or father omits information that facilitates detailed coding of occupational categories and assignment of occupational status scores. The questions which are used in the Census of Population and Housing provide information that would ensure greater confidence in the occupational status scores assigned to each occupation. These questions solicit, with reference to the week before the information was collected, information on the industry in which an individual works, the name of the company or organization, the kind of work being done at the place of employment, and the classification of the industry as manufacturing, wholesale trade, retail trade, or other type of industry. To assess occupation, the respondent is asked to describe

the type of work they do, and most important duties. The class of worker distinguishes between workers in private industry, family businesses and farms, various levels of government, and those who are self-employed. If more than one job is held, the respondents are to reply based on the one in which they worked the most hours the previous week (1980 Census of Population and Housing). The range of information provided by such questions eliminates the uncertainty that is involved when job titles alone must be interpreted.

Mother's supportive attitude and father's supportive attitude, like mother's and father's education, are measured independently and are treated separately in the analysis. The perceived attitude of each parent is measured by an item which asked whether the father, then the mother, approves of the respondent's current major. The items, along with their means and standard deviations are presented in Table 5. The means of 2.90 and 2.89 for mother's and father's degree of supportiveness indicate that the women in this sample consider their parents extremely supportive of their major.

Math and science preparation is measured by a summative index consisting of the mathematic placement score assigned to each student by the university, and an item which combines their scores on the ACT mathematics and natural science examinations. For the twenty-three students missing scores on the ACT tests, their score on the SAT mathematics exam was substituted for the missing ACT scores. These two items were standardized prior to index construction.

Verbal and social science preparation is measured by a summative index consisting of the English placement score assigned to each student by the university, and an item which combines their scores on the ACT English and social science examinations. For the twenty-three students missing on the ACT test scores, their score on the SAT verbal exam was substituted for the missing ACT scores. These two items were standardized prior to index construction. These measures are expected to be highly reliable and valid given that they are taken from university records and do not involve student reports.

Race is taken from the sampling frame designation provided by the Ohio State University. Race is coded as a dichotomous variable with white as the reference category and non-white coded one. This was done based on the belief that the small number of non-white women in the sample would make it difficult to find effects based on a more detailed coding of race. The item and the codes are presented in Table 5.

Results

The bivariate relationships among the variables, utilizing the linear and curvilinear measures of enrollment balance are presented in Table 6. Performance pressure and role entrapment are related to persistence in the hypothesized direction. Each has a negative effect on women's likelihood of persistence, with performance pressure having a statistically significant negative effect on persistence. The parabolic measure of enrollment balance is significantly related to persistence. This indicates that women in both female-dominated and male-dominated majors are likely to persist, while persistence is lower among women in majors with more balanced enrollment.

Both desirability of marriage and perceived difficulty of combining family and career are negatively but non-significantly related to women's persistence in their major. The bivariate relationships between parental measures and persistence are in the expected direction. Parental characteristics such as mother's and father's education, their occupational status and supportive attitude are all positively related to persistence, though only the relationship between father's supportive attitude and persistence is statistically significant. Household income and level of preparation in mathematics and science are negatively but non-significantly related to persistence. In contrast, women's level of preparation in verbal and social science areas is positively, but non-significantly related to persistence. The relationship of race and maternal employment with persistence are noteworthy, though they are both non-significant.

Table 6. Bivariate Correlation Coefficients of Likelihood of Persistence, Enrollment Balance, Parental and Academic Preparation Variables (N=265)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Persistence(1)	1.000																	
Prop. Male(2)	-.057	1.000																
Prop. Male^2(3)	.212	-.039	1.000															
Perf. Press.(4)	-.238	.053	.018	1.000														
Role Entrap.(5)	-.087	.102	-.032	.070	1.000													
Desire Marr.(6)	-.065	-.185	.007	.078	.022	1.000												
Family & Work(7)	-.033	.167	-.036	.035	.798	-.441	1.000											
House. Inc.(8)	-.076	.135	-.008	.092	.033	-.058	.117	1.000										
Mother's Educ.(9)	.085	.108	-.038	-.121	.046	-.123	.119	.294	1.000									
Father Educ.(10)	.033	.122	-.075	-.030	-.087	-.072	.003	.446	.443	1.000								
Mother Occ.(11)	.028	.043	-.099	.058	.011	-.079	.069	.249	.534	.227	1.000							
Mother Emp[a](12)	-.002	.082	-.077	-.107	-.023	-.017	-.006	-.124	.224	-.031	.000	1.000						
Father Occ.(13)	.038	.039	-.041	-.084	-.033	.021	-.033	.288	.266	.548	.235	-.161	1.000					
Mother Supp.(14)	.069	-.118	.133	-.151	-.021	.065	-.056	.021	.016	.069	.011	.106	.018	1.000				
Father Supp.(15)	.149	-.057	.173	-.084	-.103	.065	-.088	.065	-.003	.082	.022	.104	.068	.552	1.000			
Math Prep.(16)	-.055	.162	-.015	.197	.038	-.017	.041	.139	.037	.061	.155	.015	.012	-.121	-.036	1.000		
Verbal Prep.(17)	.087	.131	-.101	-.013	.138	-.042	.144	.074	.066	.061	.151	.036	.126	-.069	-.024	.578	1.000	
Race[b](18)	-.040	.130	-.034	-.083	.084	-.071	.085	-.034	.049	.020	.019	.029	.010	.000	-.017	-.157	-.156	1.000

Correlations of |.098| or higher are significant at $p<.05$ one tail test.

[a] Reference category for mother's employment dummy is homemaker.

[b] Reference category for race dummy is white.

Consistent with expected results, persistence is less likely among non-white women than it is among white women. More unexpectedly, the bivariate relationships indicate that women whose mothers work outside the home are less likely to persist than those whose mothers are homemakers.

Kanter (1977b) argued that outcomes were affected by proportional representation working through performance pressure and role entrapment. Before predicting likelihood of persistence, separate regression analyses were done to predict performance pressure and role entrapment. Desirability of marriage and perceived difficulty in combining family and career were also predicted as part of the investigation of their separate effects on persistence. Because hypotheses regarding the effects of the background and career-family variables are not specified by Kanter's (1977a) theory, two tailed tests of significance were used when assessing their effects. Kanter's (1977a) theory does provide expectations for the effect of enrollment balance on persistence, however, these fit more closely with a continuous measure of enrollment balance than with a finely categorized measure. In these models the nine category measure of enrollment balance was used because it most clearly and simply described the complex relationship between the dependent variable and enrollment, in addition to greatly increasing the proportion of variance explained. Because clear hypotheses could not be drawn for each of the nine categories, two tailed tests of significance were used in assessing the effects of this measure of enrollment balance.

Table 7 presents the equation predicting performance pressure. Regression equations were initially estimated using the continuous, linear measure of enrollment balance. This measure was not significantly related to performance pressure. Additional regression equations were then estimated using the categorical measure of enrollment balance, in an effort to examine the relationship in more detail. The categorical measure of enrollment balance indicates the complicated relationship between enrollment balance and performance pressure. Women in most of the female-dominated and balanced enrollment groups experience levels of performance pressure that are not significantly different from that experienced by women in the majors that are 0 to 9% male. In contrast, among the women in the majors that are 10-19% male, performance pressure is significantly higher than in the majors that are 0-9% male. Women in the majors that are 70-79% male and those in fields that are 90-100% male experience significantly higher levels of performance pressure than women in the majors that are 0-9% male. For women in the majors that are 80-89% male, performance pressure is not significantly different than among women in the fields that are 0-9% male. Though non-significant as a set, the nine category enrollment measure increased the proportion of variance explained in comparison to the continuous, linear measure of enrollment balance.

Several background variables also affect performance pressure. Women whose mothers are well educated experience significantly lower levels of performance pressure, as do women with good preparation in verbal and social science areas.

Table 7. Results for Performance Pressure Regressed on Enrollment, Academic Preparation and Background Variables using Categorical Measure of Enrollment (N=265).

Variables	(b)	(SE_b)	(beta)	(SR^2)
Enrollment Balance[a]				.04
10-19% Male	3.566	1.353	.264	
20-39% Male	1.610	1.335	.125	
40-49% Male	1.381	1.523	.077	
50-59% Male	1.106	1.532	.065	
60-69% Male	2.261	1.605	.114	
70-79% Male	3.225	1.514	.185	
80-89% Male	2.909	1.676	.137	
90-100% Male	6.596	3.177	.135	
Household Income	.204	.397	.035	
Mother's Education	-.603**	.212	-.228	
Father's Education	.128	.157	.065	
Mother's Occ. Status[b]	1.342**	.463	.211	
Mother's Emp. Status[b]	-.581	.816	-.047	
Father's Occ. Status	-.023	.019	-.089	
Mother's Support	-1.451	.908	-.112	
Father's Support	-.310	.960	-.023	
Math/Science Prep.	.626**	.225	.213	
Verbal/Soc. Prep.	-.442**	.222	-.148	
Race[c]	-.950	1.352	-.042	
Constant	10.999	4.091		
R^2	.16			

* Significant at $p<.05$ one tailed test.
** Significant at $p<.05$ two tailed test.
[a] Reference category for enrollment dummy variables is 0-9% male. Enrollment categories of 20-29% male and 30-39% male are combined because there is only one case in the 20-29% male enrollment group.
[b] Reference category for mother's employment dummy variable is homemaker.
[c] Reference category for race dummy variable is white.

Significantly higher levels of performance pressure are experienced by women with strong preparation in mathematics and science, and by women whose mothers have high occupational status.

The equation predicting role entrapment is presented in Table 8. Analyses initially tested the continuous, linear measure of enrollment balance. However, this measure was non-significantly related to role entrapment. Further equations were estimated, using the categorical measure. The categorical measure of enrollment balance more adequately summarizes the complicated relationship between enrollment balance and role entrapment. Women in the majors that are 10-19% male, and those in majors that are 40-49% male experience significantly higher levels of role entrapment than women in the majors that are 0-9% male. Women in the majors that are 60-69% male and those that are 80-89% male also report significantly higher levels of role entrapment than the women in the majors that are 0-9% male. Interestingly, the level of role entrapment reported by women in majors that are 70-79% male and those in majors that are 90-100% male is not significantly different from that experienced by women in the fields of study that are 0-9% male. This measure of enrollment balance was significant as a set. The level of role entrapment experienced by the women in this research is also affected by their background characteristics. Women with highly educated fathers experience a significantly low level of role entrapment. Feelings of role entrapment are significantly increased for women with strong preparation in social science and verbal areas.

Desirability of marriage and family life, and career-family conflict were also predicted.

Table 8. Results for Role Entrapment Regressed on Enrollment, Academic Preparation and Background Variables using Categorical Measure of Enrollment (N=265).

Variables	(b)	(SE_b)	(beta)	(SR^2)
Enrollment Balance[a]				.07**
10-19% Male	2.244**	1.024	.224	
20-39% Male	.166	1.010	.017	
40-49% Male	2.413**	1.152	.182	
50-59% Male	1.405	1.160	.112	
60-69% Male	2.652**	1.214	.180	
70-79% Male	1.569	1.146	.121	
80-89% Male	2.762**	1.268	.175	
90-100% Male	-1.061	2.404	-.029	
Household Income	.210	.300	.049	
Mother's Education	.229	.161	.117	
Father's Education	-.236**	.119	-.163	
Mother's Occ. Status[b]	-.215	.350	-.046	
Mother's Emp. Status[b]	-.327	.617	-.035	
Father's Occ. Status	-.006	.014	-.029	
Mother's Support	.314	.687	.033	
Father's Support	-1.166	.726	-.115	
Math/Science Prep.	-.124	.171	-.057	
Verbal/Soc. Prep.	.460**	.168	.207	
Race[c]	1.144	1.023	.069	
Constant	4.893	3.096		
R^2	.13			

* Significant at $p<.05$ one tailed test.

** Significant at $p<.05$ two tailed test.

[a] Reference category for enrollment dummy variables is 0-9% male. Enrollment groups of 20-29% male and 30-39% male are combined because there is only one case in the 20-29% male enrollment group.

[b] Reference category for mother's employment dummy variable is homemaker.

[c] Reference category for race dummy variable is white.

Initial analyses employed the continuous, linear measure of enrollment balance. This measure was not significantly related to these variables. Additional regression equations were then estimated using the categorical measure of enrollment balance and the background variables. These equations are presented in Table 9 and Table 10. Table 9 indicates that desirability of marriage is predicted solely by enrollment balance. Women in the majors that are 20-39% male report that marriage and family life are more highly desirable than do women in the majors that are 0-9% male. The difference between the two groups is statistically significant. There is also a statistically significant difference in the reported desirability of marriage between women in majors that are 60-69% male and that that are 0-9% male. Women in the majors that are 60-69% male report that marriage is less desirable than do the women in the majors that are 0-9% male. It is interesting to note that there is no significant difference between reported desirability of marriage between women in the majors that are over 70% male, and those in the majors that are 0-9% male. The measure of enrollment was significant as a set.

The equation predicting women's perceived difficulty in combining career and family is presented in Table 10. Women in the majors that are 40-49% male are significantly different from the women in the majors that are 0-9% male in that women in the 40-49% male majors expect greater difficulty in combining family life and career than those in majors that are 0-9% male.

Table 9. Results for Desirability of Marriage Regressed on Enrollment Balance, Academic Preparation and Background Variables using Categorical Measure of Enrollment (N=265).

Variables	(b)	(SE_b)	(beta)	(SR^2)
Enrollment Balance[a]				.11**
10-19% Male	1.288	.780	.167	
20-39% Male	1.569**	.770	.214	
40-49% Male	.320	.878	.031	
50-59% Male	-.479	.883	-.050	
60-69% Male	-1.876**	.925	-.165	
70-79% Male	1.159	.873	.116	
80-89% Male	-.487	.966	-.040	
90-100% Male	-.818	1.831	-.029	
Household Income	-.131	.229	-.040	
Mother's Education	-.171	.122	-.114	
Father's Education	-.057	.090	-.051	
Mother's Occ. Status[b]	-.045	.267	-.012	
Mother's Emp. Status[b]	.267	.470	.039	
Father's Occ. Status	.014	.011	.091	
Mother's Support	.044	.523	.006	
Father's Support	.102	.553	.013	
Math/Science Prep.	.106	.130	.063	
Verbal/Soc. Science Prep.	-.086	.128	-.050	
Race[c]	-.552	.780	-.043	
Constant	9.196	2.359		
R^2	.14			

* Significant at p<.05 one tailed test.
** Significant at p<.05 two tailed test.
[a] Reference category for enrollment dummy variables is 0-9% male. Enrollment groups of 20-29% male and 30-39% male are combined
[b] because there is only one case in the 20-29% male group. Reference category for mother's employment dummy variable is homemaker.
[c] Reference category for race dummy variable is white.

Table 10. Results for Perceived Difficulty of Combining Family Life and Career Regressed on Enrollment Balance, Academic Preparation and Background Variables using Categorical Measure of Enrollment (N=265).

Variables	(b)	(SE_b)	(beta)	(SR^2)
Enrollment Balance[a]				.08**
10-19% Male	.101	.146	.070	
20-39% Male	-.115	.144	-.084	
40-49% Male	.336**	.164	.176	
50-59% Male	.140	.165	.077	
60-69% Male	.399**	.173	.187	
70-79% Male	.037	.163	.020	
80-89% Male	.309	.180	.136	
90-100% Male	.053	.342	.010	
Household Income	.075	.043	.122	
Mother's Education	.041	.023	.144	
Father's Education	-.018	.017	-.088	
Mother's Occ. Status[b]	-.015	.050	-.021	
Mother's Emp. Status[b]	-.055	.088	-.041	
Father's Occ. Status	-.003	.002	-.091	
Mother's Support	-.016	.098	-.012	
Father's Support	-.078	.103	-.053	
Math/Science Prep.	-.031	.024	-.097	
Verbal/Soc. Prep.	.067**	.024	.209	
Race[c]	.143	.146	.060	
Constant	.537	.441		
R^2	.15			

* Significant at $p<.05$ one tailed test.
** Significant at $p<.05$ two tailed test.
[a] Reference category for enrollment dummy variables is 0-9% male. Enrollment groups of 20-29% male and 30-39% male are combined because there is only one case in the 20-29% male enrollment group.
[b] Reference category for mother's employment dummy variable is homemaker.
[c] Reference category for race dummy variable is white.

Women in the majors that are 60-69% male also differ significantly from those in the fields of study that are 0-9% male. The women in the 60-69% male majors believe that the combination of career and family will be more difficult than do women in the most female-dominated fields of study (0-9% male). The categorical measure of enrollment was significant as a set. Preparation in verbal and social science areas also predicts expectations of difficulty in combining career and family. Women with strong preparation in these areas anticipate difficulty in combining family life and career. This relationship is statistically significant.

Upon determining the predictors of performance pressure and role entrapment, these and the other variables were used to predict likelihood of persistence in the undergraduate major. Initial regression equations employed the continuous, linear measure of enrollment balance. This was not significantly related to persistence. Further analyses used the categorical measure of enrollment balance. It was determined that the relationship indicated by the categorical measure could be more simply expressed as the curvilinear measure discussed earlier. These analyses confirmed that the parabolic curve was the most efficient and accurate means of summarizing the relationship between enrollment balance and likelihood of persistence. The equation using the curvilinear measure is presented in Table 11. As was discussed earlier, the parabolic curve in this analysis has values from high to low and back to high. The measure indicates that the effect of enrollment balance on persistence is very different from

Table 11. Results for Persistence Regressed on Enrollment Balance, Performance Pressure, Role Entrapment, Desirability of Marriage, Perceived Difficulty of Combining Family Life and Career, Academic Preparation and Background Variables using a Curvilinear Measure of Enrollment (N=265).

Variables	(b)	(SE_b)	(beta)
Enrollment Balance			
Proportion Male	.430	.581	.049
Proportion Male2	7.447*	2.197	.220
Performance Pressure	-.077*	.025	-.197
Desirability of Marriage	-.016	.062	-.024
Difficult Combining Family/Career	.102	.554	.028
Role Entrapment	-.058	.072	-.111
Household Income	-.270	.154	-.119
Mother's Education	.041	.084	.040
Father's Education	.043	.061	.056
Mother's Occ. Status	.195	.183	.078
Mother's Emp. Status[a]	-.214	.314	-.044
Father's Occ. Status	-.005	.008	-.053
Mother's Support	-.225	.355	-.044
Father's Support	.728**	.375	.136
Math/Science Prep.	-.148	.088	-.128
Verbal/Soc. Science Prep.	.207**	.088	.176
Race[b]	-.281	.533	-.032
Constant	5.875	1.629	
R^2	.15		

* Significant at $p<.05$ one tailed test.
** Significant at $p<.05$ two tailed test.
[a] Reference category for mother's employment dummy variable is homemaker.
[b] Reference category for race dummy variable is white.

what was hypothesized using Kanter's (1977a) theory. Women in male-dominated majors, as well as those in female-dominated majors are highly likely to persist in their current field of study. This is contrary to expectations that the environment and interactions in male-dominated majors would result in lower likelihood of persistence among the women in those fields.

Likelihood of persistence in the undergraduate major is also predicted by parental and background variables. The effects of the maternal background variables operate for the most part through performance pressure. Recall that performance pressure was predicted significantly by maternal education and occupational status. Of the parental background measures, only father's supportive attitude directly impacts likelihood of persistence. Likelihood of persistence is significantly higher among women who report that their fathers are supportive of their choice of major.

Likelihood of persistence is also significantly, positively related to women's level of preparation in verbal and social science areas. The effects of several background variables are interesting to note, though they are non-significant. When marriage and family life are considered desirable, women are less likely to persist in their fields of study. Persistence in the undergraduate major is positively but non-significantly related to the amount of difficulty women expect in combining career and family life. As expected the likelihood of persistence is lower among non-white women than it is among white women, though non-significant. This finding merits further study on a more appropriate sample. The low number of non-white women in this

research may have made it difficult to detect the indirect or direct effect of race on women's persistence in their field of study.

Kanter (1977b) argued that experiences of performance pressure and role entrapment, brought about by unbalanced group representation, would affect outcomes for women. Table 11 indicates that both performance pressure and role entrapment are negatively related to likelihood of persistence, though only the relationship with performance pressure is statistically significant. Women who experience high levels of performance pressure are significantly less likely to persist in their current field of study than women who experience little or no performance pressure.

Because of their opposite effects in the analysis, the indicators of mathematics and verbal preparation were tested for problems of multicollinearity. Several regression equations were estimated in which the two variables were placed in the equation separately and in combination. The opposite signs exhibited in the bivariate relationships were retained in all equations. Neither indicator achieved significance in predicting persistence when placed in separate equations, though the verbal and social science indicator was close to significance. When placed in the same equation, the direction of the relationships remained the same, with verbal and social science preparation achieving significance. The standard errors of the regression coefficients showed very little increase which suggests the absence of problems with multicollinearity between the indicators.

Interactive effects of several measures with enrollment were predicted in this research. The interactive effects of performance pressure, role entrapment, mothers' and fathers' occupational status, mothers' employment and parental level of education, verbal and mathematics preparation, household income, and race were tested separately with the categorical and continuous measures of enrollment. The non-significant effects indicated that the effects of these variables on persistence in the major do not vary by the enrollment balance of the field of study. It is clear that an additive model, rather than an interactive one, more effectively explains women's persistence in their fields of study.

Discussion

This research found support for the impact of proportional representation and performance pressure on outcomes, in this case, on women's persistence in their major. However, the relationships are a great deal more complex than Kanter's (1977a) theory indicates. The complexity is centered around the issue of proportional representation in groups. Its effects have not proven to be as simple or as powerful as was expected.

Kanter (1977a) argued that unbalanced representation of types of people leads to experiences of performance pressure and role entrapment among minority group members. These experiences in turn produce compensatory behaviors, such as withdrawal from the situation. Greater imbalances in group membership are expected to increase the likelihood and strength of the experiences and reactions (Kanter 1977a).

The relationship between enrollment balance and experiences of performance pressure and role entrapment among undergraduate women is a very complicated one. Higher proportions of males in the major do not coincide with strong experiences of performance pressure or role entrapment; neither relationship could be accurately summarized with a linear measure. The nine category measure explained much more of the variance. The categorical measure used in this analysis indicates that there are significant, unexpected variations between categories. For example, women in enrollment categories of 0-9% male and 10-19% male differ significantly in the level of performance pressure they experience. Kanter's (1977a) theory does not suggest that such

differences should be present given that the categories are so close in terms of representation of women. The same is true for the three categories representing majors that are 70-100% male.

Contrary to Kanter's (1977a) theory, representation of types of people in a group has a strong, direct curvilinear effect on the likelihood of persistence. The theory suggests that the relationship would be indirect, operating largely through performance pressure and role entrapment, and linear with the likelihood of women's persistence decreasing as the proportion of men in the major increases. The analysis indicates that persistence is high among women in male-dominated as well as female-dominated majors.

The strong likelihood of persistence among women in male dominated and female dominated majors compared with women in the majors with more balanced enrollment warrants further discussion. Availability of support from other women in the majors may account for the high likelihood of persistence. The women in the most extremely male-dominated majors in this research were all engineering students. Unlike the situation reported in previous research involving women in male-dominated fields, these women have greater opportunity to establish relationships with other women, and to make themselves known to the faculty in their academic area. Women in engineering at The Ohio State University have access to an organized, formal support system administered by the college of engineering. The organization brings women together to discuss professional and academic issues, in addition to career development. This network may foster an atmosphere of tolerance or legitimation, thus increasing their likelihood of

persistence in the field.

For women in female dominated majors, the effect of being with other women may be positive. The largely single-sex environment of these majors may be an enjoyable or satisfying one in which to work. Although the question must be examined in greater detail, this may account for the strong likelihood of persistence among women in female dominated majors.

An alternative explanation for the pattern of persistence among these women involves gender roles. The appropriateness of traditionally female preferences for women may come into question as they achieve greater occupational opportunity. As a result, the need to justify choices, and build an identity in support of those choices that was once reserved for women entering male-dominated fields may now be important for women who choose majors traditionally reserved for females. It may be this commitment to the major that increases the likelihood of persistence.

This research has found that the likelihood of persistence among undergraduate women in male-dominated majors is high, and contributes to an unusual pattern of strong persistence among women in gender-marked fields of study. Though its effect is more complex than Kanter's (1977a) theory suggests, enrollment balance has an important effect on women's persistence in their major. Enrollment balance also impacts performance pressure which in turn influences persistence. Performance pressure decreases the likelihood of persistence, yet it is present to a significant degree among women in male-dominated majors. These are some of the women most likely to persist in their field.

Kanter's theory of tokenism must be critically reexamined and a new perspective developed which addresses these complex relationships and incorporates new influences.

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